In re Patent Application of:
LE VAN SUU
Serial No. **10/045,956**
Filing Date: **OCTOBER 26, 2001**
_____/

In the Claims:

Claims 1-16 (Cancelled).

17. (Currently amended) A modulation/demodulation device capable of operating according to a plurality of modulation types each using a different carrier frequency and comprising:

a microprocessor for providing transmit digital information;

a modulator for modulating, according to a given modulation type from among the plurality of modulation types, a transmit signal at a given carrier frequency based upon a signal of a predetermined duration representative of the transmit digital information;

a sending/receiving device coupled to said modulator; and

a demodulator coupled to said sending/receiving device and demodulating a received signal by determining a given type of modulation and given carrier frequency for the received signal, and analyzing the received signal based upon the given type of modulation to detect whether the received signal has the predetermined duration and supplying received digital information from the received signal to said microprocessor~~.~~;

said demodulator comprising:

a plurality of bandpass filters each centered on a respective one of the carrier frequencies and filtering

the received signal,

a respective gain controllable operational amplifier coupled to each of said bandpass filters and providing an output,

at least one comparator for comparing the output from each operational amplifier with a reference signal and providing a respective state signal for each output, and

an encoding circuit for encoding the state signals to determine a modulation type of the received signal.

18. (Previously presented) The modulation/demodulation device according to Claim 17 wherein said modulator comprises a generator for generating the transmit signal at the given carrier frequency, and wherein said generator comprises:

a memory for storing R digital codes each representative of a sinusoid;

at least one address counter for scanning successive addresses of the R digital codes at a frequency;

a digital-to-analog converter (DAC) coupled to said memory for converting the R digital codes and supplying an analog signal at the carrier frequency; and

a bandpass filter coupled to said DAC for passing the analog signal at the carrier frequency.

19. (Previously presented) The modulation/demodulation device according to Claim 18 wherein the frequency is equal to R

times the carrier frequency.

20. (Previously presented) The modulation/demodulation device according to Claim 18 wherein said at least one address counter comprises two address counters for scanning successive addresses at different frequencies; and wherein said generator further comprises a routing circuit for routing addresses of the two address counters as a function of the transmit digital information.

21. (Previously presented) The modulation/demodulation device according to Claim 18 wherein said modulator comprises means for counting a number of cycles of said at least one address counter to determine the predetermined duration.

22. (Previously presented) The modulation/demodulation device according to Claim 18 wherein said modulator further comprises means for determining the frequency of scanning of said at least one address counter based upon the carrier frequency and the number R.

23. (Canceled).

24. (Currently amended) The modulation/demodulation device according to Claim ~~23~~ 17 further comprising a selection circuit for cooperating with said encoding circuit for selecting among the filtered received signals from said bandpass filters.

25. (Currently amended) The modulation/demodulation device according to Claim ~~23~~ 17 wherein each gain controllable operational amplifier comprises:

first, second and third comparators for comparing the filtered received signal input to said gain controllable operational amplifier to respective first, second, and third thresholds and supplying the state signals based upon the comparisons;

a logic circuit for combining the state signals from said comparators and selectively delivering pulses based thereon;

an up/down counter for receiving the pulses supplied by said logic circuit; and

a network of switchable resistors coupled to said up/down converter and providing feedback to said first, second, and third comparators.

26. (Previously presented) The modulation/demodulation device according to Claim 25 wherein said up/down counter:

increments contents thereof when the filtered received signal input to said gain controllable operational amplifier is greater than the second threshold but less than the first and third thresholds;

decrements the contents thereof when the filtered received signal input to said gain controllable operational amplifier is greater than the first, second, and third thresholds; and

does not modify the contents thereof when the filtered received signal input to said gain controllable operational amplifier is greater than the first and second thresholds but is less than the third threshold.

27. (Previously presented) The modulation/demodulation device according to Claim 25 wherein said up/down counter controls the network of switchable resistors to modify the feedback resistance.

28. (Currently amended) The modulation/demodulation device according to Claim ~~23~~ 17 wherein said plurality of bandpass filters comprise switched capacitor type filter means.

29. (Currently amended) The modulation/demodulation device according to Claim ~~23~~ 17 wherein said plurality of operational amplifiers comprise switched capacitor amplifier means.

30. (Currently amended) The modulation/demodulation device according to Claim 17 wherein said demodulator comprises:

means for sampling each ~~the~~ received signal and encoding amplitudes of the samples into representative codes;

means for counting the samples and determining a period of the signal;

means for counting the number of periods of the received signal and determining whether the number of periods

corresponds to a binary digit 1 or a binary digit 0; and

means for recording a succession of binary digit 1's and binary digit 0's.

31. (Previously presented) The modulation/demodulation device according to Claim 30 wherein said means for sampling and encoding comprises:

a translation circuit for translating and shaping the received signal;

a sampling circuit for sampling the translated and shaped signal; and

an analog-to-digital converter for converting the samples to the representative codes.

32. (Currently amended) The modulation/demodulation device according to Claim 30 wherein said means for counting the samples comprises:

a first comparator for comparing the representative codes of the samples with a code representative of a threshold and supplying a state signal when the amplitude of the sample is greater than the threshold;

a latch for storing the state signal supplied by said first comparator;

a sample counting circuit for counting a number of the samples; and

a second comparator for comparing the number of counted samples to an expected number of samples and supplying a

validation signal when the number of counted samples and the expected number of samples are equal.

33. (Previously presented) The modulation/demodulation device according to Claim 30 wherein said means for counting the number of periods comprises:

a counter for counting the number of periods of the received signal;

a first comparator for comparing the counted number of periods to a number N of periods for a binary digit 1 and supplying a first validation signal if the counted number of periods and the number N are equal; and

a second comparator for comparing the counted number of periods to a number M of periods for a binary digit 0 and supplying a second validation signal for the digit 0 if the counted number of periods and the number M are equal.

34. (Previously presented) The modulation/demodulation device according to Claim 17 wherein said sending/receiving device sends the transmit signal to a remote site, and wherein said demodulator receives the received signal from the remote site via said sending/receiving device.

35. (Currently amended) A modulation/demodulation device comprising:

a modulator for modulating, according to a given modulation type from among the plurality of modulation types each

using a different carrier frequency, a transmit signal at a given carrier frequency based upon a signal of a predetermined duration representative of transmit digital information;

a sending/receiving device coupled to said modulator; and

a demodulator coupled to said sending/receiving device and demodulating a received signal by determining a given type of modulation and given carrier frequency for the received signal, and analyzing the received signal based upon the given type of modulation to detect whether the received signal has the predetermined duration and supplying received digital information from the received signal~~.~~;

said demodulator comprising:

a plurality of bandpass filters each centered on a respective one of the carrier frequencies and filtering the received signal;

a respective gain controllable operational amplifier coupled to each of said bandpass filters and providing an output;

at least one comparator for comparing the output from each operational amplifier with a reference signal and providing a respective state signal for each output; and

an encoding circuit for encoding the state signals to determine a modulation type of the received signal.

36. (Previously presented) The modulation/demodulation

device according to Claim 35 wherein said modulator comprises a generator for generating the transmit signal at the given carrier frequency, and wherein said generator comprises:

a memory for storing R digital codes each representative of a sinusoid;

at least one address counter for scanning successive addresses of the R digital codes at a frequency;

a digital-to-analog converter (DAC) coupled to said memory for converting the R digital codes and supplying an analog signal at the carrier frequency; and

a bandpass filter coupled to said DAC for passing the analog signal at the carrier frequency.

37. (Previously presented) The modulation/demodulation device according to Claim 36 wherein the frequency is equal to R times the carrier frequency.

38. (Previously presented) The modulation/demodulation device according to Claim 36 wherein said at least one address counter comprises two address counters for scanning successive addresses at different frequencies; and wherein said generator further comprises a routing circuit for routing addresses of the two address counters as a function of the transmit digital information.

39. (Previously presented) The modulation/demodulation device according to Claim 36 wherein said modulator comprises

means for counting a number of cycles of said at least one address counter to determine the predetermined duration.

40. (Previously presented) The modulation/demodulation device according to Claim 36 wherein said modulator further comprises means for determining the frequency of scanning of said at least one address counter based upon the carrier frequency and the number R.

41. (Canceled).

42. (Currently amended) The modulation/demodulation device according to Claim ~~41~~ 35 further comprising a selection circuit for cooperating with said encoding circuit for selecting among the filtered received signals from said bandpass filters.

43. (Currently amended) The modulation/demodulation device according to Claim ~~41~~ 35 wherein each gain controllable operational amplifier comprises:

first, second and third comparators for comparing the filtered received signal input to said gain controllable operational amplifier to respective first, second, and third thresholds and supplying the state signals based upon the comparisons;

a logic circuit for combining the state signals from said comparators and selectively delivering pulses based thereon;

an up/down counter for receiving the pulses supplied by

said logic circuit; and

a network of switchable resistors coupled to said up/down converter and providing feedback to said first, second, and third comparators.

44. (Previously presented) The modulation/demodulation device according to Claim 43 wherein said up/down counter:

increments contents thereof when the filtered received signal input to said gain controllable operational amplifier is greater than the second threshold but less than the first and third thresholds;

decrements the contents thereof when the filtered received signal input to said gain controllable operational amplifier is greater than the first, second, and third thresholds; and

does not modify the contents thereof when the filtered received signal input to said gain controllable operational amplifier is greater than the first and second thresholds but is less than the third threshold.

45. (Previously presented) The modulation/demodulation device according to Claim 43 wherein said up/down counter controls the network of switchable resistors to modify the feedback resistance.

46. (Previously presented) The modulation/demodulation device according to Claim 35 wherein said demodulator comprises:

means for sampling each the received signal and encoding amplitudes of the samples into representative codes;

means for counting the samples and determining a period of the signal;

means for counting the number of periods of the received signal and determining whether the number of periods corresponds to a binary digit 1 or a binary digit 0; and

means for recording a succession of binary digit 1's and binary digit 0's.

47. (Previously presented) The modulation/demodulation device according to Claim 46 wherein said means for sampling and encoding comprises:

a translation circuit for translating and shaping the received signal;

a sampling circuit for sampling the translated and shaped signal; and

an analog-to-digital converter for converting the samples to the representative codes.

48. (Currently amended) The modulation/demodulation device according to Claim 46 wherein said means for counting the samples comprises:

a first comparator for comparing the representative codes of the samples with a code representative of a threshold and supplying a state signal when the amplitude of the sample is greater than the threshold;

a latch for storing the state signal supplied by said first comparator;

a sample counting circuit for counting a number of the samples; and

a second comparator for comparing the number of counted samples to an expected number of samples and supplying a validation signal when the number of counted samples and the expected number of samples are equal.

49. (Previously presented) The modulation/demodulation device according to Claim 46 wherein said means for counting the number of periods comprises:

a counter for counting the number of periods of the received signal;

a first comparator for comparing the counted number of periods to a number N of periods for a binary digit 1 and supplying a first validation signal if the counted number of periods and the number N are equal; and

a second comparator for comparing the counted number of periods to a number M of periods for a binary digit 0 and supplying a second validation signal for the digit 0 if the counted number of periods and the number M are equal.

50. (Previously presented) The modulation/demodulation device according to Claim 35 wherein said sending/receiving device sends the transmit signal to a remote site, and wherein said demodulator receives the received signal from the remote

site via said sending/receiving device.

51. (Currently amended) A method for modulating and demodulating a signal comprising:

modulating, according to a given modulation type from among the plurality of modulation types each using a different carrier frequency, a transmit signal at a given carrier frequency based upon a signal of a predetermined duration representative of transmit digital information;

sending the transmit signal to a remote site and receiving a received signal from the remote site; and

demodulating the received signal by determining a given type of modulation and given carrier frequency for the received signal by:

filtering the received signal using a plurality of bandpass filters each centered on a respective one of the carrier frequencies,

amplifying the outputs of the bandpass filters,

comparing each of the amplified outputs with a reference signal and providing a respective state signal therefor, and

encoding the state signals to determine a modulation type of the received signal; and

analyzing the received signal based upon the given type of modulation to detect whether the received signal has the predetermined duration and supply received digital information from the received signal.

52. (Previously presented) The method according to Claim 51 further comprising generating the transmit signal at the given carrier frequency by:

storing R digital codes each representative of a sinusoid;

scanning successive addresses of the R digital codes at a frequency;

converting the R digital codes to an analog signal at the carrier frequency; and

filtering the analog signal using a bandpass filter centered at the carrier frequency.

53. (Previously presented) The method according to Claim 52 wherein the frequency is equal to R times the carrier frequency.

54. (Cancelled).